

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (currently amended): A distributed-feedback semiconductor laser, comprising:
an active region for generating the gain of a laser beam, and
a diffraction grating formed in said active region, and wherein
front and back surfaces between which said active region is interposed, wherein
the front end surface out of the front and back end surfaces between which said active
region is interposed has a reflectivity of 1 percent or less,
the back end surface ~~out of said two end surfaces~~ has a reflectivity of 30 percent or more
when viewed from the back end surface side toward the front,
the coupling coefficient κ of said diffraction grating is 100 cm^{-1} or more,
the length L of said active region is $150 \mu\text{m}$ or less, and
a combination of κ and L ~~so that these parameters provide~~ provides a $\Delta\alpha/g_{\text{th}}$ of 1 or more,
where $\Delta\alpha$ is the gain difference between modes and g_{th} is a threshold gain.

2. (currently amended): The distributed-feedback semiconductor laser as defined in claim 1
wherein the product of said coupling coefficient κ and said active region length L is at least 1 and
not more than 3.

3. (previously presented): The distributed-feedback semiconductor laser as defined in claim 1 wherein the active region length L is not longer than L_p where L_p is the length of the active region provided that the dependency of $\Delta\alpha / g_{th}$ on the active region length L is plotted and $\Delta\alpha / g_{th}$ is on a peak in value.

4. (previously presented): The distributed-feedback semiconductor laser as defined in claim 1 wherein said diffraction grating is a gain coupled structure or loss coupled structure, or has a structure in which two or three out of the gain coupled, loss coupled, and refractive index coupled structures are mixed, or is of a structure that is refractive index coupled and $\lambda / 4$ shifted.

5. (previously presented): The distributed-feedback semiconductor laser as defined in claim 1 wherein said diffraction grating has a structure that is refractive index coupled and $\lambda / 4$ shifted, and the $\lambda / 4$ shift position is at a distance backward from the front end of said active region by 75 percent \pm 5 percent where the longitudinal direction length of said active region is 100 percent.

6. (previously presented): The distributed-feedback semiconductor laser as defined in claim 1 wherein the back end surface of said active region is formed by etching, and the longitudinal direction length of the entire device including the distributed-feedback semiconductor laser is longer than 150 μm .

7. (original): The distributed-feedback semiconductor laser as defined in claim 6 wherein said device is so structured to include another function region integrated behind the distributed-feedback semiconductor laser through an end surface gap formed by said etching process.
8. (original): The distributed-feedback semiconductor laser as defined in claim 7 wherein said other function region has a light-receiving function.
9. (original): The distributed-feedback semiconductor laser as defined in claim 8 wherein the front end surface of said other function region is formed tilted relative to the back end surface of said active region.
10. (previously presented): The distributed-feedback semiconductor laser as defined in claim 7 wherein said other function region has a reflection function to said active region.
11. (previously presented): The distributed-feedback semiconductor laser as defined in claim 1 wherein the reflectivity of the back end surface of said active region is set to 90 percent or more.
12. (original): The distributed-feedback semiconductor laser as defined in claim 11 wherein the reflectivity of the back end surface of said active region is set to 90 percent or more by providing a high-reflection film on said back end surface.

13. (original): The distributed-feedback semiconductor laser as defined in claim 12 wherein a window that guides light out from said active region is formed on said high-reflection film.

14. (currently amended): The distributed-feedback semiconductor laser as defined in claim 1 wherein materials that constitute said active region comprise at ~~lease~~ least one selected from the group of A1, N and Sb.

15. (previously presented): The distributed-feedback semiconductor laser as defined in claim 1 wherein the distributed-feedback semiconductor laser has a series resistance of 50 ohms \pm 10 ohms.

16. (currently amended): A distributed-feedback semiconductor laser array, monolithically comprising ~~an~~ ~~a~~ monolithic array of the distributed-feedback semiconductor lasers, as defined in claim 1 wherein

each distributed-feedback semiconductor laser comprises:

an active region for generating the gain of a laser beam,

a diffraction grating formed in said active region, and

front and back surfaces between which said active region is interposed, wherein

the front end surface has a reflectivity of 1 percent or less,

the back end surface has a reflectivity of 30 percent or more when viewed from the back end surface side toward the front,

the coupling coefficient κ of said diffraction grating is 100 cm^{-1} or more,

the length L of said active region is 150 μ m or less, and
a combination of κ and L provides a $\Delta\alpha/g_{th}$ of 1 or more, where $\Delta\alpha$ is the
gain difference between modes and g_{th} is a threshold gain, and
the distributed-feedback semiconductor lasers have different wavelengths from one
another.

17. (currently amended): An optical module, comprising that comprises the a distributed-
feedback semiconductor laser, as defined in claim 1, wherein the distributed-feedback
semiconductor laser comprises:

an active region for generating the gain of a laser beam,
a diffraction grating formed in said active region, and
front and back surfaces between which said active region is interposed, wherein
the front end surface has a reflectivity of 1 percent or less,
the back end surface has a reflectivity of 30 percent or more when viewed from
the back end surface side toward the front,
the coupling coefficient κ of said diffraction grating is 100 cm^{-1} or more,
the length L of said active region is 150 μ m or less, and
a combination of κ and L provides a $\Delta\alpha/g_{th}$ of 1 or more, where $\Delta\alpha$ is the gain
difference between modes and g_{th} is a threshold gain.

18. (cancelled).

19. (cancelled).

20. (cancelled).

21. (currently amended): A distributed-feedback semiconductor laser as defined in claim 1,
further comprising wherein an external reflector is provided behind the distributed-feedback
semiconductor laser as defined in claim 1.

22. (cancelled).

23. (currently amended): An optical module, that comprises the comprising a distributed-
feedback semiconductor laser array, wherein

the distributed-feedback semiconductor laser array comprises a monolithic array of
distributed-feedback semiconductor lasers, and

each distributed-feedback semiconductor laser comprises:

an active region for generating the gain of a laser beam,

a diffraction grating formed in said active region, and

front and back surfaces between which said active region is interposed, wherein

the front end surface has a reflectivity of 1 percent or less,

the back end surface has a reflectivity of 30 percent or more when viewed

from the back end surface side toward the front,

the coupling coefficient κ of said diffraction grating is 100 cm^{-1} or more,

the length L of said active region is 150 μ m or less, and
a combination of κ and L provides a $\Delta\alpha/g_{th}$ of 1 or more, where $\Delta\alpha$ is the
gain difference between modes and g_{th} is a threshold gain, and
the distributed-feedback semiconductor lasers have different wavelengths from one
another as defined in claim 16.